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ABSTRACT

Research on the relation between teacher behavior and pupil change has been an active field of inquiry for a number of years but the degree of agreement of results across various studies is not high. This paper is an examination of four studies seeking parallel bits of results which may be of use to classroom teachers. Research methodologies were parellel in that (a) pupil cognitive and noncognitive measures of classroom mean regressed gain from fall to spring were the dependent measures; (b) factor scores from two to four observation instruments were used as independent measures; and (c) nonlinear relations were tested in all studies, interactions in two. The greatest pupil gain was associated with (1) intermediate amounts of teacher control, the particular amount varying with task complexity; and (2) smaller amounts of work at high cognitive levels. Pupil socioeconomic status, more often than variables, interacted with classroom process. (RC)

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An Attempt to Identify Measures of Teacher Effectiveness from Four Studies*

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Although research on the relation between teacher behavior and pupil change has been an active field of inquiry for a number of years, the degree of agreement of results across various studies is not high (Dunkin & Biddle, 1974), and there have been few attempts to make recommendations or to draw "principles of teaching" from the integration of several studies.

There are numbers of reasons for not expecting the results of different studies of even the same teaching behaviors to agree with very high consistency: the lack of power of the typical study (Cohen, 1969); the small proportion of the variance in pupil gain which is probably available to influence by differences in teaching behavior, partly as a consequence of problems of measurement, but probably also because the possible effect of the teacher is limited, as compared with influences outside of school (Soar & Soar, 1975). Studies of pupil gain are further confounded by differences in the way pupils are assigned to teachers, and the probability that the average level of the teacher behavior for the group of teachers studied may determine the relationship found (Soar, 1972). But beyond these, consistent results are probably more difficult to find because few studies have used similar observation instruments and studied the same time periods. It seemed useful, then, to look for parallels in findings from studies of different teacher and pupil groups in which similar methodologies were employed, recognizing the fact the studies have been done by the same investigators and may risk introducing another kind of bias. This paper, then, is such an examination of four studies, frankly seeking parallel bits of results which may be of use to classroom teachers.

The first of the studies produced two sets of unexpected findings for which support was sought in the following three studies. The first of these, the inverted "U", was the finding that there was a nonlinear relation between pupil gain in achievement and a measure of teacher behavior which appeared to reflect teacher structuring and control of thinking and the development of subject matter. The shape of the curve was an inverted U; that is, the greatest pupil gain was associated with an intermediate amount of the teacher behavior, with lower pupil gain for either higher or lower amounts. In other words, there was an optimum level of this kind of teacher behavior, and the assumption that "more is better" (which is implicit whenever product-moment correlations are calculated) did not appear to be valid.

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The second unexpected finding, the differentiated "U", was that different kinds of pupil learning differed in the amount of the teacher structuring and limit setting which was associated with greatest pupil gain. Although all of the outcome measures in that study had been chosen to represent skills, and fell at least at intermediate levels in Bloom's taxonomy, there still were differences suggesting that the higher the cognitive level of the learning objective, the less the degree of this kind of teacher control which was appropriate for greatest pupil learning. That is, greater amounts of pupil freedom were functional for more abstract learning tasks. Since the result was shown in curves which separated, the concept was termed the differentiated "U".

In the studies which followed, measures of pupil achievement believed to differ in cognitive level (i.e., spelling vs. vocabulary) have been studied, explicitly looking for evidence that different kinds of teacher behavior are functional for growth in different kinds of pupil learning.

While Bloom's taxonomy was developed to meet the needs of test builders for a way of scaling test items for degree of cognitive complexity, this principle has not typically been carried over to studies of classroom observation and teacher effectiveness, and differences in complexity of pupil outcome measures have not commonly been recognized.

Procedure

The four studies were as follows: The first involved 55 classrooms grades 3 through 6, covering all socioeconomic levels, but with the middle and upper levels overrepresented, and with all white pupils (Soar, 1966; 1968). The second study included 20 first grade classrooms in several programs in Follow-Through and represented primarily disadvantaged children, both black and white (Soar & Soar, 1972). The third sample was made up of 59 fifth grade classrooms, including all SES levels, but with the lower social classes overrepresented, evenly divided between black and white, and both rural and urban (Soar & Soar, 1973). The fourth sample was made up of 20 first grades from an urban setting with both blacks and whites and the full range of social status represented (Soar & Soar, 1973).

In all four studies measures of pupil standing were collected in the fall and in the spring, including several measures of achievement which were selected to differ in cognitive level. In three studies, measures of personality, creativity, and/or self-concept were obtained as well. In all cases. the pupil measures were reduced to regressed gain classroom means.

Between fall and spring classroom behavior was observed in each classroom, using at least two low-inference observation systems, and in the last three studies, four observation systems were used to reflect teacher classroom management, the response of pupils to this behavior and expression of affect the extent to which subject-matter development followed principles of Deweyian experimentalism, and the cognitive level of the teacher-pupil interaction following Bloom's taxonomy. In addition to these measures obtained from sign systems, a category system recording teacher-pupil interaction was also used. Data from these instruments were factor analyzed and reduced

to factor scores to place classrooms on dimensions of classroom behavior (in three studies data were pooled across instruments to obtain the final set of measures).

Relations between classroom behavior and pupil change were tested for boht linear and nonlinear relations, and in the latter two studies in which pupil characteristics were available, including socioeconomic status, interactions of these personological variables with classroom behavior were tested. These analyses were carried out by multiple regression, using the classroom as the unit of analysis (Cohen, 1968; Walberg, 1971; Kerlinger & Pedhazur, 1973). These tests would permit answering questions such as: Is greater pupil gain related in a consistent manner to emotional climate in the classroom (a linear relation)? Is greatest pupil gain associated with an intermediate amount of a classroom behavior rather than either high or low amounts (nonlinear relation)? Or, is a particular classroom behavior associated with greater gain for pupils from low socioeconomic status than from high (an interaction)?

Results

Linear relations. Among the linear relations, there appeared to be consistencies for several classes of measures. In three of the studies, there was support for the expected relation between emotional climate and gain. In each case, it was the expression of negative affect rather than positive which was related with gain (negatively), whereas expression of positive affect did not show a significant relationship in any study.

A class of variables which probably produced more relationships than any other was that of the degree of task focus or teacher structuring of the learning activity. Further, within task focus, some measrues indicate a degree of teacher limit setting and control which leave pupils very little freedom (a drill session, for example); but others, such as indirect teacher behavior, appear to represent a style of teacher control of learning which is not nearly so confining, but still supplies some degree of structure and focus. At the other extreme are measures which appear to describe classrooms in which pupil physical activity occurs at a high level, but with little evidence of pupil involvement in any learning task. All four studies are represented at one or more points in this rough continuum of measures. Among these relationships there appears to be a trend in which the most closely structured learning activities tended to relate to gain in low cognitive level learning outcomes. Measures which reflected a structure which afforded some degree of control and yet some degree of pupil initiative appeared to relate to gain measures at higher cognitive levels. For example, teacher indirectness related with growth in creativity; and a measure which represented pupils assigned to seatwork, but free to follow other choices after they had completed in (a mix of control and free), also related to complex growth. On the one hand, a measure apparently representing large amounts of physical movement in the classroom tended to relate negatively to the same measure of gain in creativity, and a similar measure in another study reflecting considerable physical activity with no evidence of task focus related negatively to gain in reading.

Data on the cognitive level of the interaction between teachers and pupils were collected in three of the studies, and in two of the three, larger amounts of high cognitive level interaciton were associated with decreased

achievement gain. In contrast, measures which represented a mix of the levels ranging from memory to interpretation in Bloom's Taxonomy tended to relate positively to gain in achievement. It is of interest to note that the two studies which showed significant relationships were both studies at the first grade level, and the study which failed to show relationships was at the fifth grade level.

On the other hand, the fifth grade study did show a positive relation between interaction at the higher levels (really mid-levels of Bloom's Taxonomy) and pupil increase in positiveness of self-concept.

Nonlinear relations. In all four studies, nonlinear relations were found between measures of achievement gain and measures of teacher behavior which appeared to represent teacher limitation of pupil freedom in the development of subject matter and thought. In the first study, the measure was one of teacher indirectness, with greatest pupil gain occurring in those classrooms in which an intermediate amount of indirect teacher interaction with pupils occurred. In the second study, a similar pattern of relations was found between a measure of complex pupil achievement gain and two measures of classroom behavior: one reflecting the relative proportion of the learning activities assigned by the teacher in contrast to those chosen by the pupil; the other representing the balance between interaction characterized as drill, in contrast to that in which pupil initiation occurred with some frequency. In the third study, three achievement measures selected to differ in cognitive level showed the same nonlinear, inverted U relationship with a measure called Recitation. In the fourth study, the amount of teacher-pupil interaction at the second level of Bloom's taxonomy, Translation, also showed the inverted U relationship with achievement.

In the third study, the measure called Recitation also related to several measures of pupil self-concept gain in the form of the inverted U, suggesting that pupils grew in self-regard in settings with an appropriate degree of task focus, rather than settings in which a high degree of self-direction was permitted.

Some evidence, then, was found, for the nonlinear, inverted U relationship in each of the studies, and for self-concept gain as well as achievement gain.

With regard to the differentiated U, limited evidence was found in three of the studies. In the first, vocabulary and reading differentiated in the order which was believed to follow Bloom's taxonomy, and a measure of pupil growth in creativity from Torrance's battery showed greatest gain at a level of teacher indirectness which was sharply different from reading and vocabulary. In the second study, the measure of complex-abstract achievement gain showed the inverted U relationship cited earlier for two classroom behavior measures, but a measure of simple-concrete achievement gain, primarily memory, showed essentially no relationship in either case. In the third study, spelling grew most rapidly in classrooms where a significantly greater amount of Recitation occurred than was true for classrooms in which reading and vocabulary showed greatest gain.

There is some additional support for the idea that different kinds of achievement grow best under different teaching styles in another study which

is not one of the four being reported here (Soar, 1971). In it, several programs in Follow Through were compared for relative achievement gain at three different cognitive levels. A highly structured program using conditioning principles and programmed learning was at or near the top for the lowest and intermediate levels of achievement measures, but shifted to a position near the bottom for the achievement measure at the highest cognitive level.

Although the evidence is not as consistent as that for the inverted U, and the differences between the degrees of teacher control are not great for different cognitive levels of achievement gain, there does appear to be some evidence in several studies supporting the basic concept of the differentiated U -- the idea that the teaching style which is best depends on the cognitive level of the learning objective. On the other hand, it is perhaps not surprising that it is difficult to find consistent support for a concept which seeks differences in teaching style associated with differences in learning objectives, when historically it has been difficult to find any teacher behaviors consistently related to any pupil achievement gain. But on the other hand, it seems possible that the difficulty of relating teacher behaviors to pupil gain may partly be a consequence of the past failure to recognize these differences in learning objectives.

Interactive Relations - In the latter two studies, personal characteristics of pupils were analyzed to ask the question, "Do different groups of pupils respond differently to the same teacher behavior," or "Does the teacher behavior associated with greatest pupil growth differ for different pupil groups?"

Although a number of pupil characteristics such as IQ, anxiety level, or degree of dependency were examined in this way, the pupil characteristic which most often made a difference in the way a teacher behavior was related to achievement gain was socioeconomic status (SES). As examples, in the third study, SES made a difference in the effect shown by the expression of negative affect in the classroom, with the strongest relationship (negative) being shown for low SES pupils, and essentially no relationship between negative affect and achievement gain for high SES pupils. In the fourth study, a first grade sample, an interaction between the cognitive level of teacher-pupil interaction and pupil socioeconomic status indicated that low SES pupils showed the sharpest decrease in achievement gain with teacher interaction at a high cognitive level. This result appeared for two achievement measures. This finding seems to be a variation on the linear relationships reported earlier for pupils to show decreased achievement gain with increased teacher interaction at a high cognitive level. In effect, this teacher behavior was nonfunctional for all children in that study, but even less functional for low SES pupils.

Another kind of interactive relationship, one between two kinds of classroom behavior, also appeared for measures of self-concept in that same study. It indicated greatest gains in self-esteem for pupils in classrooms characterized by both greater amounts of interaction at low cognitive levels and also by a positive emotional climate. Again, there is evidence of self-concept gain in task-oriented settings; of the value for at least young pupils of interaction at a low cognitive level; and of the value of a warm emotional climate, if it is associated with task structure.

Discussion

Although linear relationships have most often been used in studies of teaching effectivenss to identify relationships between classroom behavior and pupil gain, it seems clear that they are limited in the extent to which they can help us answer the question of what good teaching is. They are simplistic in implying that if some of a behavior is good, more is better; and once the question is raised, it becomes difficult to imagine very many behaviors for which increasing amounts would be unqualifiedly good. Perhaps researchers have been protected by teachers who have understood this and not produced extreme amounts of the behaviors under study. But the advocates of change in teacher behavior do not often identify limits for the behavior they recommend increasing or decreasing. There may, of course, be a small number of measures for which straightline relationships really are appropriate, such as negative affect. It would not be surprising if increasing amounts of this behavior were increasingly destructive. But it seems doubtful that such relations are typical, as the use of product-moment correlation implies.

Although it is difficult to formulate, the idea that many of the linear and nonlinear relationships lead to much the same conclusions is intuitively attractive. Different measures which have shown linear relationships with pupil gain have reflected different degrees and ways in which teachers set limits and focus pupil learning activities. There is consistency across the differences in the ways these measures related to pupil gain. Measures reflecting very narrow focus tended to relate only to pupil gain at a low cognitive level, primarily memory. Activities with a broader focus or ones which offered pupils some degree of initiative and self-direction, such as indirect teacher behavior, or the measure which represented both seatwork on an assigned task and freedom of choice when the assignment was finished, tended to relate to more complex, higher cognitive levels of achievement. But the measures in which focus had become so broad as to become lack of focus, measures representing a high degree of physical activity with little evidence of involvement with specific learning tasks, tended to related negatively to achievement gain. These various linear relationships viewed as a whole seem to suggest that considerable focus is functional for low cognitive level learning, that a balance of focus of direction with some degree of pupil freedom is appropriate for more complex kinds of learning, but that even for these objectives, some degree of structure, direction and limit-setting is still functional. Freedom of activity can be too great for pupil growth, even for complex achievement.

The nonlinear relations support this same basic conception. Measures reflecting degree of control seemed to relate in similar ways to pupil gain -- intermediate amounts were associated with greatest gain, and either greater or lesser amounts of the behavior were associated with decreased gain. If the measure represented a balance between more extreme behaviors such as drill or pupil initiation, or between teacher directed and pupil selected learning activities, greatest pupil growth was similarly associated with intermediate values of the measure. There was also some evidence that the inverted U holds true for gain in self-concept as well as achievement.

In addition to this, the inverted U's show some tendence to differentiate for different kinds of gain, with greatest pupil gain for low level objectives

being associated with somewhat greater degrees of teacher control than the higher level objectives, which also agrees with the patterning of the linear relationships.

The negative relationships between high cognitive level interaction and pupil gain, even for complex achievement measures, raise question about the recommendations which are often made to teachers to ask more higher order questions. It may be that the negative consequences only occur in the lower grades, and there is some evidence which suggests that the effect is greatest for low SES pupils.

With respect to the question of whether young children are able to carry out complex performances, it seems clear that young children do abstract and generalize -- high level performances on Bloom's Taxonomy. Learning the meaning of words such as "larger", "better", "under" which represent concepts or relations rather than objects, and learning the meanings by inference from context, seems to be such a case. So it does seem relevant to ask how a teacher should interact with young children to facilitate such processes.

It may be that teachers are often not alert to cues that the interaction is not a good "match" with where many of the children are, and that the teacher may move ahead, interacting with the small number of pupils for whom it is a good match, unaware that many pupils are unable to cope effectively. While these possibilities are clearly speculative, what the results clearly do is bring into question the kind of "universal prescription" which implies (although not stated so bluntly) that all teachers should ask all pupils more higher level questions. They point rather to the need for qualifiers such as, what proportion of higher level questions, toward what kind of learning objective, for what pupil group?

These results should not be taken as supporting the conclusion that teachers should spend all their time with the lower cognitive level objectives or in closely focussed learning activities, nor do they indicate that teachers should spend most of their time with activities in which pupils have considerable amounts of freedom and self-determination. Rather, they suggest that it is important for the teacher to recognize differences in the cognitive level of the learning objective being sought, and to provide the varying amounts of teacher control and freedom for pupil self-direction appropriate for these objectives. They suggest that the lower level objectives are best learned under closely focussed, carefully organized, clearly structured learning activities, but that if pupils are to gain in more complex learning objectives as well, they also need experience with greater degrees of self-direction, but that even here there is still a degree of structure which is necessary for most effective learning.

A question which is sometimes raised is whether some subject-matter areas are of themselves low cognitive level and others high. Rather, it seems likely that most subject-matters have elements that run the gamut from low to high. For example, achievement tests in some areas such as reading and arithmetic have subtests at different cognitive levels. While it may be useful for a pupil to understand conceptually how the multiplication table is derived, for him to multiply and divide competently, he must know the

multiplication table well; that is, it must be a memory level function. A learning activity aimed at attaining this objective with pupils seems critically important. Indeed, some researchers have argued that the higher cogntive level activities cannot be carried out without an adequate undergirding of knowledge at the lower cognitive levels (Taba, Levine and Elzey, 1964), and this seems very reasonable. What these results suggest, then, is that within any subject matter, the teacher should vary the closeness of focus of the learning task on which pupils are working, depending on the cognitive level of the task.

There is some evidence, as well, that pupils differ in the kind of classroom environment which is most functional for growth. It may well be that as we learn more about the classroom conditions which facilitate growth in pupils, the inverted U will differentiate into families of curves whose peaks fall at different points along the scale of degree of focus or control, depending on the age or grade level of the pupil, his socioeconomic status, his anxiety level, his degree of dependency or internality of control, the cognitive level of the learning task, and probably other influences now unsuspected.

But we tend in educational thinking to ignore complexities and to seek simple answers to complex questions. It seems paradoxical that recent findings from research with disadvantaged pupils on occasion tend to be presented in ways which suggest their application to all pupils, when research on educating the disadvantaged had its initial impetus from the belief that earlier research with middle class pupils could not be generalized to them. Rather, it seems likely that both the cognitive level of the learning objective, and a variety of characteristics of the pupil will need to be recognized in planning instruction.

Summary and conclusions

Because of the limited power of the typical study of teacher effectiveness, we can never be sure whether a result is an "isolated curiosity" except by looking for consistencies across studies using similar methodologies. When this attempt was made for one series of studies, the findings seem to raise question about several of what appear to be "Universal Prescriptions" for increasing teacher effectiveness (perhaps overstated for the sake of brevity):

i.) Teachers should use conditioning principles and programmed learning to increase pupil achievement.

ii.) Open classrooms, by eliminating "mindless" teacher restriction on pupils, will lead to increased growth.

iii.) Teachers should spend more time working at higher cognitive levels.

Since all of these "prescriptions" have considerable currency, and there is little indication of the limits of their effectiveness, such evidence seems worth reporting. The evidence from these studies raises serious question about each of these "prescriptions."

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